

Stormwater CONNECTIONS

Fall 2007

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Reining in the rain

Rain gardens are just what they sound like- gardens that soak up rain water from sources such as your lawn, driveway or roof. These landscaped areas with flowers, shrubs, and other vegetation are a great way to combine gardening with a more natural way to clean and filter stormwater. Compared to a patch of conventional lawn, a rain garden allows about 30 percent more water to soak into the ground as well as reducing pollutants that make their way to local rivers and streams. The first rain gardens were created to mimic natural water retention areas by a builder in the 1990s. They are now one of the fastest growing areas of interest for home landscapes.

Rain gardens work by using a series of filtration techniques. Plants and soils act to trap potential pollutants. In slow moving water, pollutants physically stick to roots and soil particles. Chemically, some pollutants and water are absorbed by plants and used in energy cycles. In the plant rooting zone, beneficial bacteria and other microorganisms can break down many of the pollutants and make them harmless. Lastly, the porous nature of the soil mix for your garden allows water to soak deeper in the ground. Biological activity in the soil provides further water treatment as water drains through it and moves on to surrounding vegetation, riparian buffer plants, or as it goes to provide stream base flow and help recharge groundwater aquifers.

According to the Environmental Protection Agency, a typical city block generates nine times more runoff than a woodland area of the same size due to impermeable surfaces.

Getting ready

Designing and planting a rain garden is similar to creating any other perennial garden, with a few unique differences.

The garden should fit with your overall landscape plan and the size of your yard and house. These shallow gardens (4–8" deep) are often saucer- or trench-shaped depressions located near driveways, downspouts or other low points that can easily retain rain. By calculating the drainage area size, you'll know how much water your garden will need to catch. And, of course, you'll want to avoid placing it too close to building foundations and utilities.

Good soil is essential. It allows water to infiltrate and slowly drain. Otherwise, soil replacement may be needed for success. Consider a mixture of 50–60 percent sand, 20–30 percent topsoil and 20–30 percent compost.



Photo and garden design by Anne Christensen Environmental Design

The rain garden above was created when problems with poor drainage left the yard soggy and partially submerged. By improving the soil mixture and adding compatible plants into the garden design, surface water percolates into ground, making the yard available for other uses. Another example, at right, shows a rain garden before and after a storm. Rain held in the depression filters down through the soil, replenishing groundwater supplies.



Inset photos by Steve Fancher

When designing your garden, select native plants that are easy to care for. Once established, they won't require extra attention. Then, to keep the soils moist and ready to soak up rain, use a mulch of shredded hardwood.

Start smart: know your local regulations

In Eugene: A residential rain garden, as described, doesn't require a permit as long as water leaving the rain garden discharges to an existing approved destination such as a street curb 'weep hole', isn't directed across property lines, and isn't redirected to a new destination.

If current development of your property is required to meet any type of stormwater development standards (destination, pollution reduction, flow control), you will need to design your rain garden to standards in the City's Stormwater Management Manual and you'll need a permit. Contact Engineering staff at the Permit and Information Center or call 682-8400.

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Water protection now and for the future

Local waterways such as Amazon Creek are part of the larger Willamette River watershed. Together, this integrated system provides many benefits such as drinking water, food (fish), irrigation water, and recreational opportunities (boating, fishing, swimming).

Under predevelopment conditions, waterways are relatively self-maintaining due to their ability to collect and slowdown runoff from rainfall, control erosion, filter pollutants, and moderate water temperature. Their effectiveness in protecting and treating water quality is related to the amount and health of

vegetation cover, channel stability, and waterway corridor width – wider is better. Healthy stream conditions help keep the watershed vibrant and teeming with life. The challenge in protecting water quality comes with land use and development and some types of home maintenance activities. This might include filling and piping of waterways, removing riparian vegetation, grading and building within and adjacent to waterways and floodplains, and releasing untreated stormwater runoff into waterways.

Current methods of prevention

As a preventive measure, existing City programs support the Federal Clean Water Act requirements in the following areas:

- To control erosion and sedimentation in waterways, protective measures must be used during land development activities.
- To reduce street-related pollutants from reaching waterways, regular street sweeping is conducted; some street drainage systems are being retrofitted with water quality features; and water quality measures are required for new and reconstructed streets.
- For fertilizer/pesticide use, public education is used to reduce and inform about best management practices.
- New development projects are required to treat stormwater runoff before it leaves the development site.
- Water quality benefits are improved by capital enhancement projects and protected by Goal 5 regulations.

Looking ahead

The City is proposing to improve the protection of water quality along certain waterways where Goal 5 requirements do not apply. The proposal has been scheduled for Eugene Planning Commission consideration on January 15, 2008. For more information, visit the City's web site: www.eugene-or.gov/PW and click-on Water Quality Protected Waterways, or contact Therese Walch, Project Manager, at 682-8647, or Tim Bingham at 682-4410.

Protecting the foundation of the public stormwater system

Some public works projects are so big or specialized that outside contractors are hired. Many require large or specific equipment, or need expert knowledge for completion.



The repair project above made the stormwater pipe more stable and reduced erosion along the stream bank by adding stone and vegetation around the pipe and extending rock into the streambed to help slow the current during higher water levels.



Surface drainage passes through the stormwater swales in this "green" improvement project along East 18th Avenue, between Agate and University streets. Pollutants are filtered out by plants, gravel and soil. This project also includes street and sidewalk improvements.

The Oregon Department of Environmental Quality (DEQ) has identified the Willamette watershed as a high priority for restoring water quality benefits that have been impacted by human activities. For more information about the "Upper Willamette River Total Maximum Daily Load," visit DEQ's Website at: www.deq.state.or.us/wq/TMDLs/willamette.



Green Umbrella

www.greenumbrellaeugene.com

The Cities of Eugene and Springfield, Lane County

Waste Management, Springfield Utility Board and Lane Regional Air Protection Agency have teamed up on a "green" radio ad campaign that provides **pollution prevention tips** for area residents.

continued from page 1

In Springfield: Rain gardens can be used to manage runoff for residential and commercial uses. Permits are not needed unless required by building/plumbing code. Contact Springfield Public Works Engineering or Environmental Services Divisions at 726-3674 for free design and construction handouts and local plant lists.

Avoid accidental damage to underground utility lines. Call the utility locate service at 1-800-332-2344 before you dig.

For ideas, tips and garden designs, visit these websites: www.raingardens.org; www.rainkc.com/gardens; www.bbg.org/gar2 (search for rain gardens). Thanks to these web sources.

Smart tips for leaf pick-up

As crisp, cool winds and rainy downpours make their grand entrance into the fall season, leaves scatter everywhere, blanketing yards and roadways. Along with these changes come potential problems that can damage local waterways and create safety problems on roadways.

Eugene's leaf collection program was started in the late 1960s to prevent street flooding from leaf-clogged gutters, catch basins and storm drains, and to protect water quality by removing leaves that can decay in waterways and lower oxygen levels in aquatic habitats. Public Works crews collect leaves in every Eugene neighborhood twice between October and January. The city is divided into five geographic areas that leaf collection crews work through to pick up leaves. Street sweepers collect remaining small debris and particles. Crews and street sweepers will have the most success collecting leaves on your street if you and your neighbors do the following:

- Wait to pile leaves in the street until the weekend before the scheduled pickup date. Leaves placed in the street too early are a safety hazard to bicyclists (children and adults). Leaves also may blow around or plug up storm drains.
- The best leaf piles are at least a foot away from the curb line; are free of branches, pine needles and other yard debris; are placed away from storm drains, corners and sidewalks; and are 15 feet away from parked vehicles. Cars parked on top of leaves or too close to leaf piles during scheduled pickup dates prevent leaves from getting collected.
- Make sure you know when the scheduled pick up dates are for your area. Remember that weather changes can cause delays. Call the leaf hotline at 682-5383 or check the website at www.eugene-or.gov/leaf for more information.



Make way! Collection and cleaning equipment needs at least 15 feet of space to maneuver around vehicles near leaf piles.



Collecting leaves around the city is no small feat. Please do your part to make this a successful season for leaf collection and help keep bike lanes and sidewalks safe for pedestrians and bicyclists.



If you hire a landscaper or lawn maintenance service that uses a blower to remove leaves from your property, make sure they know where leaves can be stored until leaf collection is scheduled for your area. Once the leaf collection program has finished for the year, leaves can no longer be blown or stored on the street.

Stormwater Services: *From Raindrop To River*

Eugene's Public Works crews perform a variety of services in the field to keep stormwater flowing smoothly and cleanly to our rivers and streams. A sampling of activities going on recently includes:

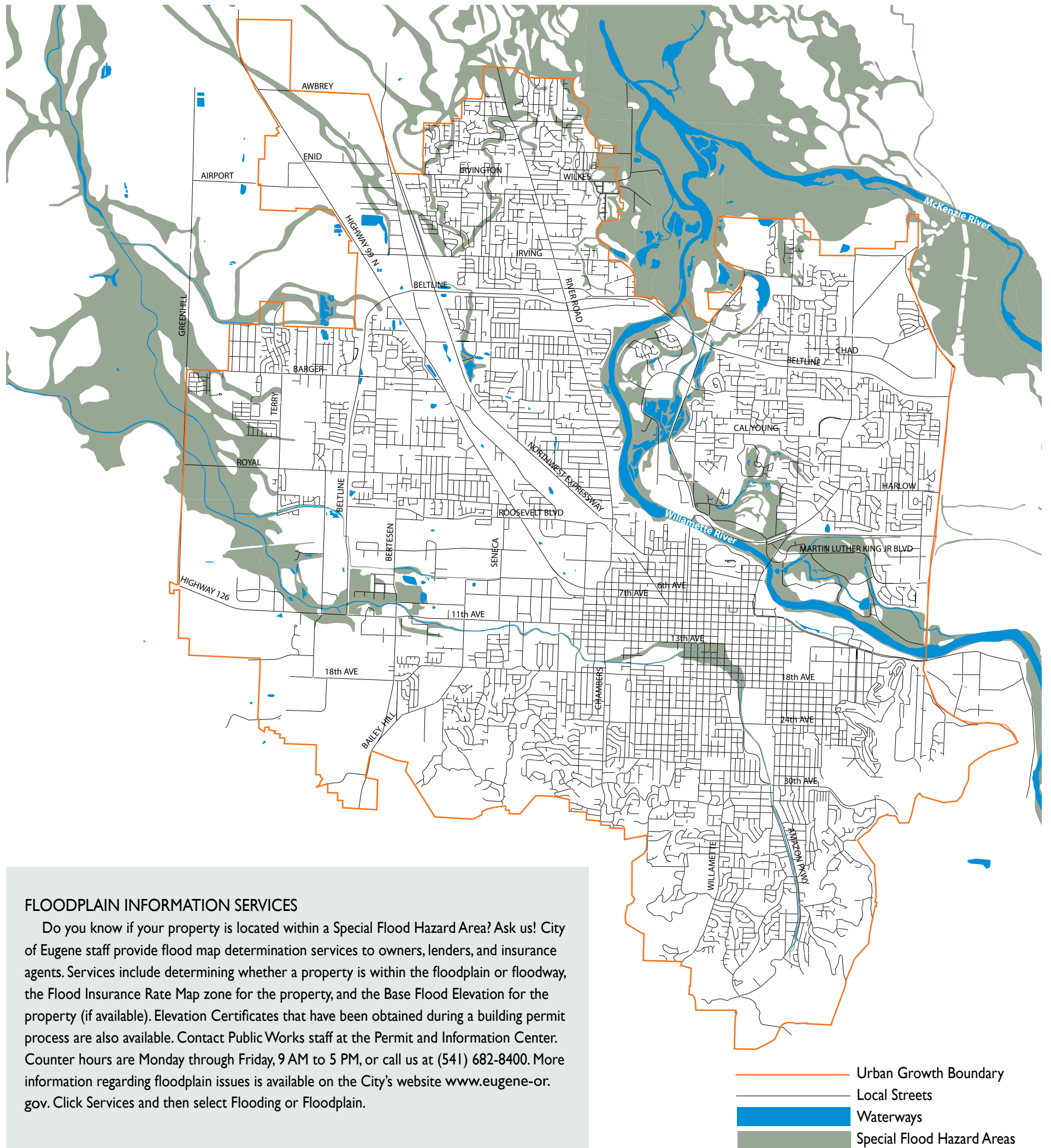


To help improve water quality, devices like this gravity flow treatment system are fit to stormwater pipes. Pollution, oil and floating debris are captured in one of the system's tanks that are routinely suctioned out by City vector trucks like the one below.



When unsafe products such as oils, paint, and chemicals spill onto local roadways or end up in our waterways, the City's vector truck and crew are called to clean up the mess. At right, cooking oil from a food business that has leaked into a channel along Roosevelt Boulevard is being removed. Cooking oil and bio-fuels are especially nasty because they cling to soil particles, organic matter (such as vegetation) and living creatures. Because oils block oxygen in the water, fish and other living beings can smother from lack of oxygen when oil is present.

Eugene Area Special Flood Hazard Zones



The Risk of Flooding

The City of Eugene's proximity to the Willamette River is no accident. The Willamette River provides transportation, recreation, industry and, of course, drinking water. The fertility of the adjoining valley is also partly due to the soil that has been deposited by the Willamette and its tributaries during floods. Flooding is a natural function of a watercourse and it shouldn't be considered abnormal. The construction of dams and levees has not eliminated this natural process.

The City of Eugene encourages those who live and own property within the floodplain to better understand their risk of flooding. Floods within developed communities shouldn't be considered natural disasters, but rather man-made events. Elevating homes and other structures within the Special Flood Hazard Area (SFHA) is a key way property owners can reduce the chance of their structures being damaged. New structures within our community are required to have the finished floor elevated to one foot above the expected hundred year flood elevation. Keep in mind that even new structures built to today's standards can be devastated by flooding.

The hundred-year flood simply refers to the flood that has a one percent chance of occurring in any given year. The area inundated by this flood is known as the Special Flood Hazard Area (SFHA). Larger floods are possible as are floods outside the SFHA due to unusual local drainage conditions. Our community has close to 20,000 acres of floodplain and nearly 10,000 individual parcels that are partially or entirely located within the floodplain.

Storm events, snow melt from higher elevations, and high ground water are all factors that can affect the chance of a flood event. Development can displace natural areas that have historically functioned as flood storage. Removal of vegetation can increase water velocity and decrease the time it takes stormwater to reach low lying areas. Cumulatively, development can increase flood severity and frequencies.

Flood Insurance

The City of Eugene participates in the National Flood Insurance Program (NFIP) which makes federally-backed flood insurance available for structures in our community. Flood insurance is available regardless of whether the structure is located inside or outside the floodplain, though it does affect insurance premiums. More than 25 percent of NFIP claims are filed for properties located outside the SFHA. Many people living in floodplains underestimate their risk of being flooded. Federal Law requires a 30-day waiting period following the purchase of flood insurance, except for the initial purchase of a structure. Flood insurance should be purchased before the onset of the rainy season to ensure coverage.

The City's floodplain management practices exceed the minimum required for participation within the NFIP. Incorporated properties within the floodplain receive a 15 percent discount on flood insurance premiums because of the City's voluntary efforts. Those outside the regulatory floodplain receive a five percent discount. This discount is automatically calculated by insurance companies.

The NFIP offers two types of coverage: structural and contents. Structural coverage includes walls, floors, insulation, furnace and other items permanently attached to the structure. Contents

The flood of 1964

The holiday season of 1964 was memorable for many due to large storms and resulting floods that swept through the area. While only a 50-year flood, the waters left many homes with water damage and streets filled with standing water. Neighborhoods near River Loop (right) and Beacon Drive (below) were some of the hardest hit near Eugene.



Residents of Clairmont Estates (left) woke up to waterfront views. Today, builders are required to elevate floors to one foot above 100-year flood levels, but many factors can cause unusual flooding in a localized area. Federally-backed flood insurance is a good way to protect structures both inside and outside of floodplains.

photos from City of Eugene files

coverage may be purchased separately to cover the contents of an insurable building. Flood insurance also pays a portion of the costs of actions taken to prevent flood damage.

Standard property insurance typically does not cover flood damage. Federal law requires that structures within the SFHA be covered by flood insurance if financing for the structure is obtained from a federally regulated or insured source — a requirement that affects nearly all mortgages financed through commercial lending institutions. This mandatory requirement stipulates that structural coverage be purchased equal to the amount of the loan, or other financial assistance, or for the maximum amount available, which is currently \$250,000 for a single family residence.

While the mandatory flood insurance purchase requirement has been in effect for many years, not all lending institutions have required flood insurance in the past. New penalties now apply for lending institutions that miss requiring the mandatory flood insurance purchase. Institutions are now routinely reviewing existing and new mortgages to determine whether the mortgaged structures are located within the floodplain and whether the structures in the floodplain have the necessary flood insurance. By law it is the lender's responsibility to determine whether a structure is within the SFHA for insurance purposes.

Flood Safety Tips

Do not drive through water. Sadly, drowning in submerged vehicles is the most common cause of death during a flood. Sinkholes, washed out roadways, and hidden debris can lurk below the surface, even in areas otherwise known by the driver. Use travel routes recommended by local authorities and do not travel on roads that are posted as closed.

Do not walk through flowing water. Currents can be deceptive. Six inches of moving water can knock you off your feet. Drowning is the number one cause of flood-related deaths.

Stay away from power lines and electrical wires. The second leading cause of flood-related deaths is electrocution. Electrical currents travel through water. For your safety, do not attempt to move a downed wire. Report any downed power lines to the power company.

Have your electricity and gas turned off by the utility company. Some appliances, such as television sets, keep electrical charges even after they are unplugged. Remember to unplug wet appliances or motors, and do not use them unless they have been taken apart, cleaned and dried.

Look out for animals. Small animals are often displaced from their homes during a flood and may seek shelter in yours. Use a pole or stick to poke and turn things over and scare away small animals.

Look before you step. After a flood, the ground floor may be covered with dangerous debris. Be careful where you step. Floors and stairs that are covered with mud can be slippery.

Be alert for gas leaks. Pipes and housing foundations can be disturbed during a flood. Use a flashlight to inspect for damage. Don't smoke or use candles, lanterns, or open flames unless you know the gas has been turned off and the area is ventilated.

Prepare an evacuation plan. An evacuation plan is a good idea in the event of any type of emergency. All members of your household should be aware of your plan, which should include a meeting place outside the house and an escape route away from flood waters.



Poor flood safety demonstrated in 1964.

Understanding the Floodplain and Regulations

Maintaining the flow capacity in streams requires cooperation and assistance to prevent flooding and bank erosion. Following are some suggestions and information for understanding how floodplains function and how activities within the floodplain are regulated in order to protect property and lives, while affording citizens the ability to obtain floodplain insurance.

Do not dump or throw anything into ditches or streams: A plugged channel cannot carry water. When it rains, the excess water must go somewhere. Trash and vegetation dumped into a stream degrades water quality of both the stream itself and its receiving waters, and every piece of trash contributes to flooding.

Remove debris, trash, loose branches and vegetation: Keep banks clear of brush and debris to help maintain an unobstructed flow of water in stream channels. Do not, however, remove vegetation that is actively growing on a stream bank. Streamside vegetation is tightly regulated by local, state and federal regulations.

Obtain required permits for development within the floodplain: All new construction in the floodplain must be constructed to minimize damage during flood events. Requirements may include anchoring against movement by floodwaters, construction resistant to flood forces, construction with flood-resistant materials, and flood-proofing or elevating so that the lowest floor is at least 1 foot above the Base Flood Elevation. These standards apply to new construction and to substantial improvements of existing structures. Additionally, most other types of development within the floodplain also require a floodplain development permit. These activities include but are not limited to grading, cut and fill, installation of riprap and other bank stabilization techniques.

Recognize the natural and beneficial functions of floodplains to help reduce flooding: Floodplains are a natural component of our environment. Understanding and protecting the natural functions of floodplains helps to reduce flood damage and protects our resources. When flooding spreads out across the floodplain, its energy is dissipated which results in lower flood flows downstream, reduced erosion of streambanks and channels, deposition of sediments higher in the watershed and improved groundwater recharge. Floodplains are scenic, valued wildlife habitat, and sometimes suitable for farming. Poorly planned development in floodplains can lead to streambank erosion, loss of valuable property, damage to property, increased risk of flooding to downstream properties and degradation of water quality.

Eugene's official
**Wet Weather Season
is October 15–April 30.**
Homeowners and contractors that have projects with exposed soil are required to use additional erosion control measures during this period to keep soils in place.
Need more information or have concerns about activity you see? Contact the Erosion Prevention and Construction Site Management staff at (541) 682-8498 or pwersion@ci.eugene.or.us.



Disturbed soil at construction sites flows into local waterways, blocking sunlight and reducing oxygen in the water for aquatic wildlife.

Protect waterways by covering soil

The mixture of soil and water during this time of year can spell disaster if it makes its way into roadways and storm drains. Why? Soils often carry other pollutants and toxic substances to nearby drains, streams and rivers.

Sediment does a great job of plugging things up as it travels through the storm drain system. Upon arrival in our rivers and streams, it continues to inflict additional damage. Sediment can block sunlight, limit plant growth, and replace oxygen in the water, making it difficult for fish to feed and breath. Salmon and trout eggs are easily smothered when coated with a layer of silt.

Stop erosion run-off with these simple steps:

- Cover exposed soil and stockpiles with materials such as tarps, mulch and hydro-seeding to protect soil surfaces from heavy rains.
- To prevent construction traffic from tracking soils off-site, construct a gravel exit pad to construction roadways.
- Remove sediment, soil and debris in or near all water features, natural resources and stormwater infrastructure (drains and roadways).



wetlands & waterways

Swift currents nibble away at stream banks

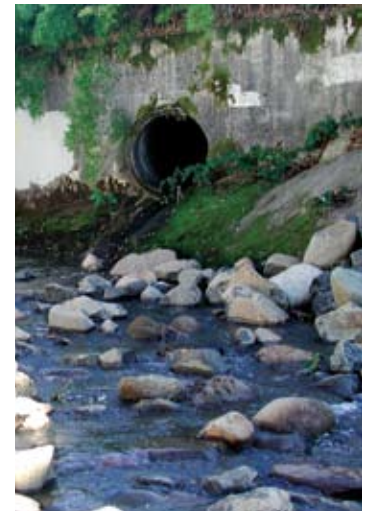
It's amazing how full the Amazon Creek can get during the fall and winter. During extended periods of heavy rains, swift moving currents vigorously churn water along several sections of the stream bank, whittling soil away at the base. Water-laden soils soon become too heavy for some sections of the bank, causing them to slump or simply fall in. Over the summer, City crews and contractors worked to repair and stabilize the banks with the help of some special equipment and then dumped several truckloads of large rock along the bank and into the streambed.

Many of Eugene's more substantial waterways are flood control channels that began as natural creeks and sloughs. These were no more than 5 – 6 feet deep with slightly sloping banks in the 1900s. During winter storms, water flowed broadly across land now covered by South Eugene High School, Amazon Park, Civic Stadium and the southern portion of the downtown area. Despite the installation of stormwater and wastewater lines in the 1920s, flooding from the Amazon creek still caused the new system to back up. By 1946, Congress authorized the U.S. Army Corps of Engineers to widen, deepen and realign the creek, changing it into its present "trapezoid" cross-sectional shape, with somewhat uniform steep-sided banks and a flat bottom. This channeling process consolidated or "tamed" the creeks and reduced flooding of inhabited areas considerably. It also enabled more farming or development of land that otherwise would be wet or even flooded during certain times of the year, each year.

For decades, this channel system has been important for carrying great volumes of potential floodwaters away from houses and fields (as it still does). The challenge these days is the volume of water that comes during winter storms that feeds the high and fast, or "flashy", rushing waters. Over even short periods of time, the sides and bottom of certain portions of the creeks or channels will erode, causing the tops of the clay soil banks, saturated and heavy with winter rain, to collapse.

Presently, as the City repairs these sites, staff are reconsidering the best solutions and using more environmentally- friendly methods than in the past. A "bio-engineered" approach is taken wherever possible. Examples include the use of natural vegetation incorporated with rock and manufactured materials such as geotextiles. These not only strengthen the repair, but ultimately achieve a more natural appearance and improve the site as habitat for native plants and creatures.

For information about creek repair projects, call Brian Elliott, environmental project specialist, at 682-4902.



Natural vegetation incorporated with rock strengthened this streambank along Amazon Creek. Large rock in the creek will help slow the current during high water levels.

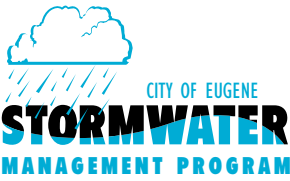
From landfill to emerging forest



There's a transformation occurring along the north bank of the Willamette River just downstream of Interstate 5 in Alton Baker Park. This stretch of land was a landfill for the Eugene/Springfield area from 1964 to 1974. Now, with the help of hundreds of volunteers working in partnership with the City of Eugene, the area is being replanted so that it will grow into a riparian forest.

Since 2001, invasive plants such as Scott's Broom and Armenian Blackberry have been removed and replaced with native trees and shrubs including big

leaf maple, Willamette Valley ponderosa pine and common snowberry. As these new trees and shrubs become established, the appearance of the landscape will alter. The riparian forest that emerges will cool the river by providing more shade and create a more desirable home for the many plant and animal species that call the riverfront their home. Curious what this looks like? Take a walk or bike ride in this area to see for yourself. Just follow the bike trail heading east from the Autzen footbridge. If helping out on this project is of interest to you, contact the Eugene Stream Team at 682-4850.



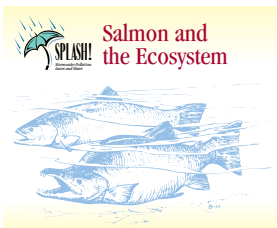
Stormwater Connections is published by the City of Eugene Public Works Department to enhance awareness of stormwater and related surface water management issues.

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Hi folks! I'm Lily, the Pacific chorus frog, and I help the City of Eugene teach people about stormwater in our community. While it seems like there is plenty of water around (especially when it rains!), we have to remember that water is shared with all life on earth. We should be careful not to pollute what we do have so there will always be plenty to go around.



Teachers: For more information about *SPLASH! Stormwater Learn and Share*, and *Salmon and the Ecosystem*, call 682-8482.

Water: Fresh or Salty, it's Nothing New!

Do you ever wonder where water comes from? As one of the necessary ingredients for all life on earth, scientists spend a lot of time studying water. Many believe water first emerged as steam from the hot magma produced by ancient volcanoes forming the Earth billions of years ago. As the new planet cooled, the steam clouds turned to rain that fell to make rivers, oceans and underground reservoirs. Over time, more cooling in some areas of the Earth changed the liquid water into ice caps and glaciers.

No New Water

Since those ancient times, no new water has been added to our planet's water supply. This means that the same water that flowed in streams when dinosaurs were on earth is still here today. Water is constantly recycled through the hydrologic cycle, moving from clouds to bodies of water and ice caps just as it did all those years ago.

Most of the water on Earth (97.25%) is stored as salt water in the oceans. As ocean water evaporates, it leaves the salt behind, and the rain that falls over land replenishes the fresh water we need to live. Part of that water flows back to the oceans, while some is captured for use by people. Other fresh water is stored underground, in lakes, and in ice.

As more and more people live on the planet and need to use this tiny amount of fresh water, it is being consumed faster than it can be renewed. Also, many types of pollution can make our fresh water unsafe for humans or other living things to use. Some pollutants may filter out of water naturally through evaporation, but will settle into the ground or flow to areas where they may stay for decades.

Take Care of What We Have

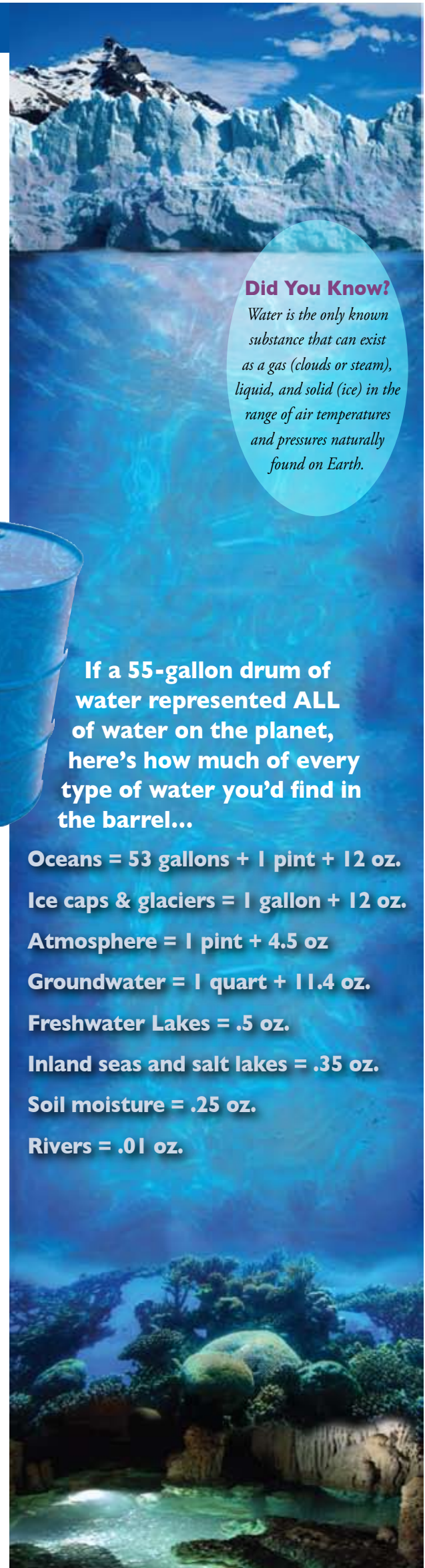
Since all of us need water, and we can't make "new" water for the future, it is up to us to be careful with the way we use water and what we add to it when we do. It's pretty simple really:

Conserve: use less water. Take shorter showers, don't run water while you brush your teeth, and try not to overwater your lawn.

Don't pollute! Keep anything you wouldn't want to swim in (including grease, automotive fluids, soap and fertilizer) out of our storm drains.

Take Lily's Water Awareness Test to learn about more ways you might be affecting the water where you live (eugene-or.gov/pw). And remember: We all live downstream!

Special thanks to our sources: USGS Water Science for Schools (ga.water.usgs.gov/edu/), NASA Earth Observatory (earthobservatory.nasa.gov), The National Weather Service Northwest River Forecast Center (nwrfc.noaa.gov) and Physical-Geography.net at the University of British Columbia, Okanagan.



Did You Know?

Water is the only known substance that can exist as a gas (clouds or steam), liquid, and solid (ice) in the range of air temperatures and pressures naturally found on Earth.

If a 55-gallon drum of water represented ALL of water on the planet, here's how much of every type of water you'd find in the barrel...

Oceans = 53 gallons + 1 pint + 12 oz.

Ice caps & glaciers = 1 gallon + 12 oz.

Atmosphere = 1 pint + 4.5 oz

Groundwater = 1 quart + 11.4 oz.

Freshwater Lakes = .5 oz.

Inland seas and salt lakes = .35 oz.

Soil moisture = .25 oz.

Rivers = .01 oz.